

CLAIMS

1. A lithographic projection apparatus comprising:

5 a radiation system to provide a projection beam of radiation;

a support structure adapted to support patterning structure which can be used to pattern the projection beam according to a desired pattern;

a substrate table to hold a substrate;

10 a projection system to project the patterned beam onto a target portion of the substrate; and

an acoustic sensor constructed and arranged to detect sounds caused by the passage of pulses of radiation of the projection beam.

2. Apparatus according to claim 1 comprising a controller responsive to an
15 output signal of said acoustic sensor, whereby said controller is constructed and arranged to control the radiation energy per unit area delivered by the projection beam to said substrate during an exposure of a target portion.

3. Apparatus according to claim 1 wherein the acoustic sensor comprises a
20 microphone or barograph located in a chamber filled with an atmosphere partially absorbent of said projection beam radiation and traversed by said projection beam during operation of the lithographic projection apparatus.

4. Apparatus according to claim 3 wherein said chamber is located between the
25 substrate table and an element of the projection system directly opposite the substrate table.

5. Apparatus according to claim 1 wherein the acoustic sensor comprises a
vibration sensor mechanically coupled to an object on which said projection beam is incident,
so as to measure vibrations in that object.

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6. Apparatus according to claim 1 wherein the acoustic sensor comprises a
microphone constructed and arranged to detect sounds emitted by an object on which the
projection beam is incident.

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7. Apparatus according to claim 5 wherein the object is the substrate.

8. Apparatus according to claim 5 wherein the object is an element of the projection system.

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9. Apparatus according to claim 3 wherein the chamber comprises structure constructed and arranged to focus sound generated by the projection beam onto the acoustic sensor.

10 10. Apparatus according to claim 9 wherein said sound focusing structure comprises an inner surface of the chamber which is elliptically shaped in at least one cross-section of the chamber.

11. An apparatus according to claim 1, wherein the support structure comprises a mask table for holding a mask.

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12. An apparatus according to claim 1, wherein the radiation system comprises a radiation source.

20 13. An integrated circuit device manufacturing method comprising:
projecting a patterned projection beam of radiation onto a target portion of a layer of radiation-sensitive material on a substrate;

detecting one of:

25 sounds caused by the passage of pulses of radiation of said projection beam;
vibrations in an object on which said projection beam is incident, and
sounds emitted by an object on which said projection beam is incident, and
controlling, responsive to the detecting, the radiation energy per unit area delivered
by said projection beam to said substrate during an exposure of a target portion.

30 14. An integrated circuit device manufactured according to the method of claim 13.

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